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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : A47J 31/40 — A1

(11) International Publication Number: **WO 00/28868**

(43) International Publication Date: 25 May 2000 (25.05.00)

(21) International Application Number: PCT/EP99/08698

(22) International Filing Date: 9 November 1999 (09.11.99)

(30) Priority Data:
98121745.8 16 November 1998 (16.11.98) EP

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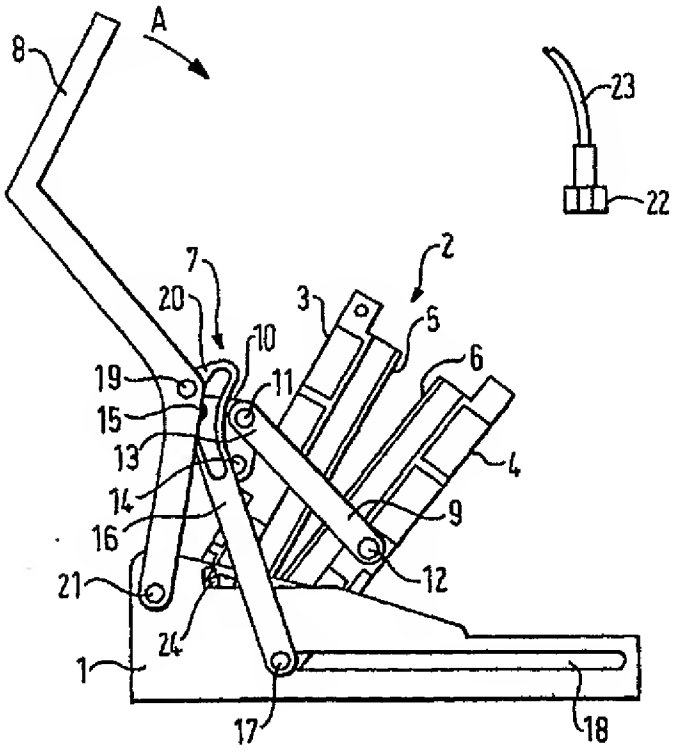
(81) Designated States: AE, AU, BA, BB, BG, BR, CA, CN, CU, CZ, EE, GE, HU, ID, IL, IN, IS, JP, KP, KR, LC, LK, LR, LT, LV, MG, MK, MN, MX, NO, NZ, PL, RO, SG, SI, SK, SL, TR, TT, UA, US, UZ, VN, YU, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: METHOD AND DEVICE FOR EXTRACTING THE CONTENTS OF A CAPSULE

(57) **Abstract**

The device according to the invention comprises: an extraction system (2) consisting of two independent and identical clamping elements (3, 4), enclosing between themselves, each for approximately one half, a housing (5, 6) for the capsule, clamping means (7) connected to the extraction system and on either side of the said extraction system and allowing the said extraction system to be pivoted from the position away from the vertical plane to the vertical position and closed and opened, and a lever system (8) connected to the said clamping means mentioned above and enabling the user to work the said means, the extraction system (2), the clamping means (7) and the lever system (8) working together on a machine supporting frame (1) and the device also comprising a mobile water inlet system above the system for the extraction of the contents of the capsule between the two clamping elements (3, 4).



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Method and device for extracting the contents of a capsule

The present invention relates to a method for extracting the contents of a capsule that has a plane of symmetry. The invention also relates to a device for implementing the method.

It is prior art to extract the contents of a closed cartridge. Patent EP 242,556 relates to a device for the preparation of a drink by extracting the contents of a cartridge placed in a cartridge holder for a coffee machine. The drawback with this device is that it comprises a water-injecting member which is a pointed member, and which consequently pierces the cartridge. This piercing of the cartridge is no longer desired, partly because it necessitates the presence of an expensive pointed member, and partly because it causes coffee grounds to move back up the said pointed member.

The object of the present invention is to develop a method and a device in which water can be supplied to extract the contents of a capsule, without tearing the said capsule, in the case of a sealed capsule. The invention also can be used to extract the contents of an open capsule.

The present invention relates to a method for extracting the contents of a capsule that has a plane of symmetry, in which the said capsule is placed in the housing of an extraction system consisting of two clamping elements that enclose between themselves, each for approximately one half, the said housing, in such a way that it is positioned in the system in a plane away from the vertical plane, the said capsule is moved into a vertical plane, in such a way that it is imprisoned leaktightly in the said system, and in such a way that a liquid inlet arrives over the top of the said capsule, and the contents of the said capsule are extracted and the coffee flows out from the bottom of the said capsule.

It is possible in accordance with the invention to extract the contents of both open and sealed capsules. As regards an open capsule, this refers to a plastic capsule or sachets of filter paper and nonwovens. The contents of the capsule are a powdery substance for the preparation of a drink, selected from roasted and ground coffee, tea, instant coffee, a mixture of instant and ground coffees, a hot chocolate product or any other dried substance suitable for consumption.

In the case of sealed capsules, it is possible to extract the contents of the capsule forming the subject-matter of patent application PCT/EP98/03826, namely a sealed flexible sachet in the form of an individual portion designed to be extracted under pressure and containing roasted and ground coffee, the sachet consisting of two identical flexible sheets or a single folded flexible sheet of circular, oval or polygonal form enclosing between the two sheets or between the two faces of the folded sheet a space for the coffee and the two sheets or the two faces of the folded sheet are stuck together around their perimeter in such a way that the said sachet is essentially symmetrical about its joining plane, and the sachet is opened merely by the increase in pressure occasioned by the injection of the extracting fluid, in which the two flexible sheets or the two faces of the folded sheet are extended on one side of the said sachet beyond their join line in order to form between the said sheets or between the two faces of the folded sheet a channel through which the extracting fluid can be introduced, the said channel being approximately perpendicular to the join line to which it leads. The method is not however limited to this kind of capsule and can be used on any capsule with a plane of symmetry and in which the sheets forming the capsule are sealed.

In the method of the invention, the extracting fluid is raised to a pressure sufficient to unseal the two sealed sheets at the point where the said fluid

arrives. In practice, the two clamping elements must grip the capsule adequately if the capsule is to resist the increase in pressure during extraction and must provide a good seal around the point where the extracting fluid arrives. The contents of the capsule are normally extracted at a pressure of between 2 and 10 bar, preferably of about 6 to 8 bar on raised and hollow portions situated on at least one of the faces of the clamping elements.

For satisfactory extraction of the coffee from the capsule, a certain amount of time is required for the extraction. However, neither should the extraction take too long, as the consumer wants to keep within the times required for the extraction of conventional espresso coffees. The method according to the invention will normally extract 250 to 300 cm^3 per minute.

The advantage of having a method whereby the capsule whose contents are to be extracted is placed in a housing on a plane away from the vertical plane is that in this case the consumer no longer has to hold the capsule holder and engage it in clamping bars. The consumer has merely to place the capsule whose contents are to be extracted in the housing and close the extraction system: this therefore eliminates all risk of disturbance, wrong positioning and the like.

The invention also relates to the device for implementing the method described above. In one embodiment, the device comprises:

- an extraction system consisting of two independent and identical clamping elements, enclosing between themselves, each for approximately one half, a housing for the capsule,
- clamping means connected to the extraction system and on either side of the said extraction system and allowing the said extraction system to be pivoted from the position away from the vertical plane to the vertical position and closed and opened, and

- a lever system connected to the said clamping means mentioned above and enabling the user to work the said means,

the extraction system, the clamping means and the lever system working together on a machine supporting frame and the device also comprising a mobile water inlet system above the system for the extraction of the contents of the capsule between the two clamping elements.

The two clamping elements have seals around the edge of the housing to ensure that the capsule whose contents are to be extracted is gripped firmly. The clamping means must allow a move from the inclined position of the extraction system to the vertical position, while also allowing the two clamping elements to come satisfactorily together, both in order to hold the said capsule properly and to prevent leaks (leaks are especially to be avoided in order that during extraction the seal between each face of the said capsule does not give). The lever allows the user to open and close the extraction system. The result is that the consumer has a very simple task to perform, namely to insert the selected capsule and pull the lever forwards, as explained in greater detail below.

Clearly, when the lever is pulled forwards for extraction, the water inlet must come down at the same time to the top of the extraction system. The water inlet pipe does not need to be fitted with a needle: it is only necessary that the pipe is so positioned that leaks cannot occur, and it is only the pressure of the water that forces its way through the seal of the capsule at the point where the water arrives.

It is possible according to the invention to provide a housing for the capsule of variable size. This means that the capsules for one cup or capsules for two cups can be used, with a mobile water inlet system that adapts itself accordingly.

In the case of a sealed capsule, during extraction, that is when the hot water is entering the

capsule, there is a pressure increase inside the said capsule: to produce an opening, there must be raised and hollow portions present in the clamping elements so that a tension sufficient to rupture the material forming the capsule is built up against the said raised and hollow portions. It may be envisaged that one or both of the clamping elements contains raised and hollow portions.

The clamping means that are useable in accordance with the invention may be variously constructed. In one particular embodiment, these clamping means consist of

- a clamping rod connected at one end to one of the two clamping elements, halfway along the length of the said element,
- an L-shaped clamping lever that is connected at its mid-point to the other end of the clamping rod, is connected to the second clamping element also halfway along the said element and is connected to a master rod, and
- a master rod, one end of which slides in a guide at the bottom of the supporting frame on a positioning pin, the other end being connected to the lever system.

In a second embodiment, the device according to the invention comprises:

- an extraction system consisting of two independent clamping elements, enclosing between themselves, each for approximately one half, a housing for the capsule, the first clamping element comprising on either side perpendicularly and in the middle of the said element an arm with a translational guide and at the end of the said arm a guide pin and the second element comprising on either side and in the middle of the said element a clamping pin,
- clamping means connected to the extraction system and on either side of the said extraction system and allowing the said

extraction system to be pivoted from the position away from the vertical plane to the vertical position and closed and opened, and

- a lever with two sides extending from the operating bar of the said lever, the latter being connected to the said clamping means mentioned above and enabling the user to work the said means,

the extraction system, the clamping means and the lever working together on a machine supporting frame and the device also comprising a fixed water inlet system above the system for the extraction of the contents of the capsule between the two clamping elements.

As in the first embodiment, the two clamping elements have seals around the edge of the housing to ensure that the capsule whose contents are to be extracted is gripped firmly. The clamping means must allow a move from the inclined position of the extraction system to the vertical position, while also allowing the two clamping elements to come satisfactorily together, both in order to hold the said capsule properly and to prevent leaks (leaks are especially to be avoided in order that during extraction the seal between each face of the said capsule does not give). The lever allows the user to open and close the extraction system. The result is that the consumer has a very simple task to perform, namely to insert the selected capsule and pull the lever forwards, as explained in greater detail below.

When the lever is pulled forwards, at the time of the extraction, the extraction system moves up towards the fixed water inlet system. The consumer places the selected capsule between the two elements of the extraction system and draws the lever forwards, which imparts a translational movement of the first clamping element and then concomitantly an upward movement of both clamping elements towards the fixed water inlet system.

In this embodiment the clamping means are simpler than in the first embodiment. They consist of a master rod, on either side of the lever system and connected at one end to the end of the arm of the said lever and at the other end to a translational and clamping pin of the first clamping element which is situated approximately in the middle of the said first clamping element, the supporting frame of the machine comprising on either side

- a translational and clamping guide for the said translational and clamping pin,
- a guide for the guide pin of the first clamping element and
- a clamping guide for the clamping pin of the second element.

The operation of the device will be explained in greater detail in relation to Figures 6 to 9. Each side of the lever forms an elbow with first and second arms, the angle of the elbow is between 100 and 140° and the axis of rotation of the said lever is at the intersection of the first and second arms and situated above the supporting frame of the machine. If the device is considered in the closed position, the axis of rotation of the said lever is approximately in the plane of contact between the two clamping elements of the extraction system. The guide for the guide pin of the first clamping element forms an angle of between 0 and 50° with the horizontal plane.

The first arm of the lever must be long enough to allow the user to operate the movement of rotation of the said lever without interfering with the rest of the machine, that is with the supporting frame of the said machine. This first arm is normally between 8 and 15 cm long. The second arm of the lever is between 20 and 40 mm long.

The first clamping element has a translational and clamping pin which engages as indicated above with a translational and clamping guide. This guide forms an elbow having an angle of between 100 and 150°.

As in the first embodiment of the device according to the invention, this second device can be used for open capsules as well as for sealed capsules. In the case of sealed capsules, one or both of the clamping elements comprises raised and hollow portions.

The two embodiments of the device according to the invention are explained in further detail with reference to the drawings, in which:

Fig. 1 is a diagrammatic side view of the device according to the invention in the open position, in a first embodiment,

Fig. 2 is a diagrammatic view of the device shown in Figure 1 in the closed position,

Fig. 3 is a diagrammatic view of the device shown in Figure 1, during the opening phase, after extraction,

Fig. 4 is a diagrammatic view of the device shown in Fig. 1 at the end of the opening phase and

Fig. 5 is a diagrammatic view of the device shown in Figure 1 showing more specifically the ejection pin.

Fig. 6 is a perspective illustration of the device according to the invention in the open position, and

Figs. 7, 8 and 9 are perspective illustrations of the device shown in Figure 6 in the open, half-open and closed positions.

Figures 1 to 4 show in fact for one embodiment of the device according to the invention the complete sequence of extraction of the contents of a sealed capsule (which is not shown). The water inlet is shown, but upstream is the entire water heating unit (not shown) by means of which the water reaches the selected capsule at the desired temperature.

The device according to the invention comprises a machine supporting frame (1) on which the entire extraction mechanism rests. The latter comprises: the extraction system (2), consisting of two independent and identical clamping elements (3, 4), each enclosing one half of a housing (5, 6) for the capsule; the clamping means (7); and the lever system (8).

The clamping means (7) comprise on either side of the clamping elements (3, 4):

- a clamping rod (9) connected at one end (12) to the clamping element (4), halfway along the length of the said element,
- an L-shaped clamping lever (10) that is connected at its mid-point (11) to the other end (13) of the clamping rod (9), is connected about the pivot (14) to the second clamping element (3), also halfway along the said element, and lastly is connected by the pivot (15) to a master rod (16) and
- a master rod (16), of which one end slides on a positioning pin (17) in a guide (18) at the bottom of the supporting frame (1), while the other end is connected about a pivot (19) to the lever system (8).

The master rod (16) also includes a working guide (20) in which there slides the pivot (15) of the clamping lever (10) during the opening or closing of the clamping elements. The lever (8) rotates on the supporting frame (1) of the machine about a pivot (21).

Lastly, the device includes a mobile water inlet system (22).

The device according to the invention works as follows:

the device is in the open position as shown in Figure 1. The capsule whose contents are to be extracted is inserted between the two clamping elements (3, 4) and positions itself in the corresponding housings (5, 6). The consumer then pulls the lever (8) in the direction of arrow A to arrive at

the closed position shown in Figure 2. The pivoting of the lever (8) works the master rod (16), and the positioning pin (17) moves along the guide (18) at the bottom of the supporting frame. The clamping lever (10) is simultaneously driven by the pivot (15), the effect of which is to move the clamping rod (9) also.

The movement of the lever (8) thus has two effects. The clamping means (7) - which consist of the clamping rod (9), the clamping lever (10) and the master rod (16) moved by the lever (8) - enable on the one hand a straightening up from the inclined position to the vertical position of the two clamping elements (3, 4) and a translational movement of these two elements towards the end of the guide (18). The configuration also means that the two clamping elements (3, 4) eventually engage to prevent leaks from the system. This result is fully achieved when the positioning pin (17) is at the extreme end of the guide (18) and when the L-shaped clamping lever (10) has one arm vertical and the other arm horizontal, when the device according to the invention is considered on a horizontal plane, which is normally the case.

Simultaneously, when the machine is closed, the water inlet system (22) comes down and positions itself centrally between the two clamping elements (3, 4). It is important also that this movement is accompanied by good leaktightness at this point.

The device is now ready to extract the contents of the capsule. The hot water arrives via the pipe (23) and the pressure of the water unseals the opening of the capsule. The rise in pressure in the said capsule allows extraction to take place through the opening against the raised and hollow portions. The coffee is collected in a cup (not shown) placed underneath the two clamping elements (3, 4) of Figure 2. Extraction normally takes about one minute. In the figures, the angle of inclination of the clamping elements is about 30°.

After extraction, the movement shown in Figure 3 is carried out, that is to say the consumer shifts the lever (8) in the direction of arrow B, which has the effect of opening the two clamping elements (3, 4). They open because the lever (8) works the master rod (16), and this also has the effect of working the clamping lever (10) and the clamping rod (9). The device is now open.

The device also includes a capsule ejecting pin (24) This ejection pin is attached to the bottom of the clamping element (3). In passing from Figure 1 to Figure 2, this pin follows the edge (25) of the supporting frame (1) and pushes the snap-action element (26) up until it finally reaches its closed position. Figure 5 shows clearly the path of this ejection pin. When extraction is completed the system is opened, which raises the ejection pin (24): it travels up along the edge (25) and then along the edge (27) of the snap-action element. When it reaches the end of the edge (27) the device is in the position shown in Figure 3, i.e. the clamping element (3) is slightly tilted in the direction of arrow C, thus allowing automatic release of the used capsule. The ejection pin (24) then drops down so that the clamping element (3) tilts in the direction of arrow D and returns the assembly to the position shown in Figure 4 where the device is now ready to extract the contents of another capsule.

Figures 6 to 9 illustrate the device according to the invention in its second embodiment. It comprises a supporting frame (30) on which are mounted the extraction system consisting of a first clamping element (31) and a second (32), the clamping means (33) (formed by a master rod) and the lever (34) (consisting of two sides (35, 36) with a bar (37) for operating the said lever). These are the moving parts of the device according to the invention. The lever is rotatable on the supporting frame about the pivot (38) and is connected at (39) to one end of the master rod (33).

The other end of the rod (33) is connected to a pivot (40) for the translational movement and clamping of the first clamping element (31). Each side of the lever (34) comprises a first arm (50) and a second arm (51): these two arms form an elbow with an angle of 110°. The first arm is 10 cm long and the second arm 3 cm long. The operating bar is 10 cm wide.

In figures 7 to 9 the front part of the supporting frame has been removed to show the various parts of the device according to the invention. Thus the first clamping element (31) can be clearly seen to comprise on either side and in the middle of the said element an arm (41) with a translational guide (42) and at the end of the said arm a guide pin (43). The second clamping element comprises on either side and in the middle of the said element a clamping pin (44) designed to slide in the abovementioned guide (42).

In Figure 6 the 3 other guides can be clearly seen on the supporting frame. The translational and clamping guide (45) comprises the translational guide part (46) and the clamping guide part (47): normally, the angle between these two parts is between 90 and 120°. This guide is intended for the translational and clamping pin (40) of the first clamping element (31). Then there is the guide (48) for the guide pin (43) of the first clamping element (31). Lastly there is the clamping guide (49) in which the clamping pin (44) of the second clamping element (32) slides. As will be seen below, the clamping pin (44) slides both in the translational guide (42) and in the clamping guide (49). There is also a stop (52) for the lever (34) and a fixed water inlet system (53).

The embodiment shown in the figures has the clamping elements (31, 32) comprising raised and hollow portions (54). That is, in this case the device is intended for extracting the contents of sealed capsules (not shown).

Operation is as follows: Figures 6 and 7 show the device in the open position. The consumer places

the capsule between the clamping elements (31, 32) and pulls the lever (34) in the direction of arrow C. The arm (51) of the lever pulls the master rod (33) and hence the first clamping element (31) in a movement of translation. The second element remains immobile during this first phase. The pin (40) slides along the guide (45) and the guide pin (43) of the arm (41) slides along the guide (48). At the point when the lever has been pulled as far as the elbow of the guide (45), the phase of the clamping of the two elements (31, 32) begins. From this point attention should be turned to the translational and clamping pins (40) of the element (31) and the clamping pin (44) of the second clamping element (32). The element (31) can be said to have a phase of translation and clamping, while the element (32) has a phase of clamping only. In this second phase of clamping, the element (31) rises as a result of the pin (40) sliding in the guide part (47) and the element (32) rises while pivoting about the guide pin (43) owing to the sliding of the pin (44) in the clamping guide (49). Figure 9 shows the final locking of the device. For completely safe closing, the axis of rotation (38) of the lever must be behind the line formed by the pins (39, 40) of the master rod (33). And finally, in order for the elements (31, 32) to clamp effectively, the guide (49) and the guide part (47) must not be exactly parallel: their directions must come together in the upward direction.

The device is thus ready to extract the contents of the capsule. The hot water arrives via the fixed water inlet system (53) and the pressure of the water unseals the opening of the capsule. The rise in pressure in the said capsule makes extraction possible through the opening against the raised and hollow portions.

A part (55) can then be provided at the outlet of the device for the coffee to flow out into a channel (56) and a cup is placed where indicated by

arrow D. As for the previous embodiment, extraction takes around about a minute.

After extraction, the lever is pulled in the direction of arrow E to separate the elements (31, 32). Another extraction can then be carried out.

Claims

1. Method for extracting the contents of a capsule that has a plane of symmetry, in which the said capsule is placed in the housing of an extraction system consisting of two clamping elements that enclose between themselves, each for approximately one half, the said housing, in such a way that it is positioned in the system in a plane away from the vertical plane, the said capsule is moved into a vertical plane, in such a way that it is imprisoned leaktightly in the said system, and in such a way that a liquid inlet arrives over the top of the said capsule, and the contents of the said capsule are extracted and the coffee flows out from the bottom of the said capsule.

2. Method according to Claim 1, characterized in that the extraction is carried out on open capsules.

3. Method of extraction according to Claim 1, characterized in that the extraction is carried out on a sealed capsule at a pressure of between 2 and 10 bar on raised and hollow portions situated on at least one of the faces of the clamping elements.

4. Method according to one of Claims 1 to 3, characterized in that the extraction is carried out at a rate of between 250 and 300 cm^3 per minute.

5. Method according to one of Claims 1 to 4, characterized in that the angular distance from the vertical plane is between 15 and 45°.

6. Device for implementing the method according to one of Claims 1 to 5, comprising

- an extraction system consisting of two independent and identical clamping elements, enclosing between themselves, each for approximately one half, a housing for the capsule,
- clamping means connected to the extraction system and on either side of the said extraction system and allowing the said extraction system to be pivoted from the

position away from the vertical plane to the vertical position and closed and opened, and

- a lever system connected to the said clamping means mentioned above and enabling the user to work the said means,

the extraction system, the clamping means and the lever system working together on a machine supporting frame and the device also comprising a mobile water inlet system above the system for the extraction of the contents of the capsule between the two clamping elements.

7. Device according to Claim 6, characterized in that the housing for the capsule can accommodate capsules of different sizes, the mobile water inlet system adapting itself accordingly.

8. Device according to either of Claims 6 and 7, characterized in that the clamping means consist of

- a clamping rod connected at one end to one of the two clamping elements, halfway along the length of the said element,
- an L-shaped clamping lever that is connected at its mid-point to the other end of the clamping rod, is connected to the second clamping element also halfway along the said element and is connected to a master rod, and
- a master rod, one end of which slides in a guide at the bottom of the supporting frame on a positioning pin, the other end being connected to the lever system.

9. Device for implementing the method according to one of Claims 1 to 5, comprising

- an extraction system consisting of two independent clamping elements, enclosing between themselves, each for approximately one half, a housing for the capsule, the first clamping element comprising on either side perpendicularly and in the middle of the said element an arm with a translational guide and at the end of the said arm a guide pin and the

second element comprising on either side and in the middle of the said element a clamping pin,

- clamping means connected to the extraction system and on either side of the said extraction system and allowing the said extraction system to be pivoted from the position away from the vertical plane to the vertical position and closed and opened, and
- a lever with two sides extending from the operating bar of the said lever, the latter being connected to the said clamping means mentioned above and enabling the user to work the said means,

the extraction system, the clamping means and the lever working together on a machine supporting frame and the device also comprising a fixed water inlet system above the system for the extraction of the contents of the capsule between the two clamping elements.

10. Device according to Claim 9, characterized in that the clamping means consist of a master rod, on either side of the lever system and connected at one end to the end of the arm of the said lever and at the other end to a translational and clamping pin of the first clamping element which is situated approximately in the middle of the said first clamping element, the supporting frame of the machine comprising on either side

- a translational and clamping guide for the said translational and clamping pin,
- a guide for the guide pin of the first clamping element and
- a clamping guide for the clamping pin of the second element.

11. Device according to either of Claims 9 and 10, characterized in that each side of the lever forms an elbow with a first and second arm with an angle of between 100 and 140° between the first and second arms, the axis of rotation of the said lever being at the

intersection of the first and second arms and situated above the supporting frame of the machine.

12. Device according to one of Claims 9 to 11, characterized in that the guide for the guide pin of the first clamping element forms an angle of between 0 and 50° with the horizontal plane.

13. Device according to one of Claims 9 to 12, characterized in that the second arm of the lever is between 20 and 40 mm long.

14. Device according to one of Claims 9 to 13, characterized in that the translational and clamping guide forms an elbow with an angle of between 100 and 150°.

15. Device according to either of Claims 6 and 7, characterized in that for the extraction of the contents of a sealed capsule, one or both of the clamping elements comprises raised and hollow portions.

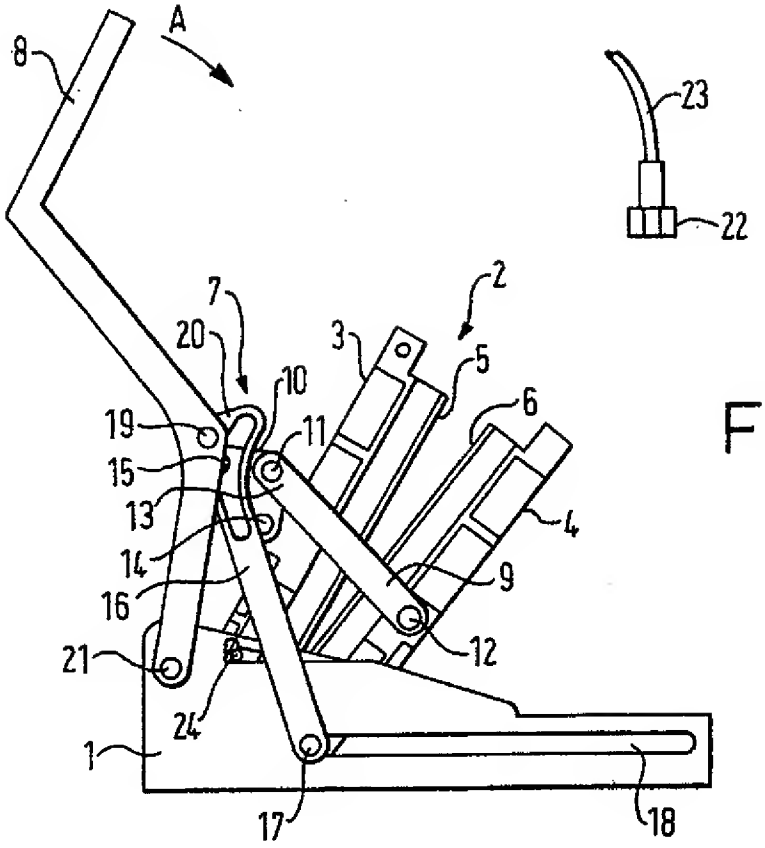
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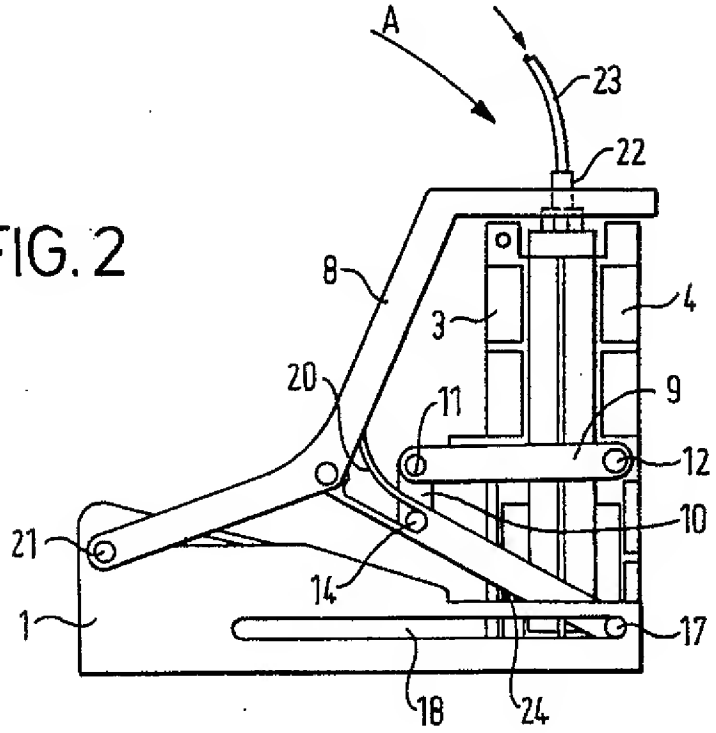
FIG. 1

FIG. 2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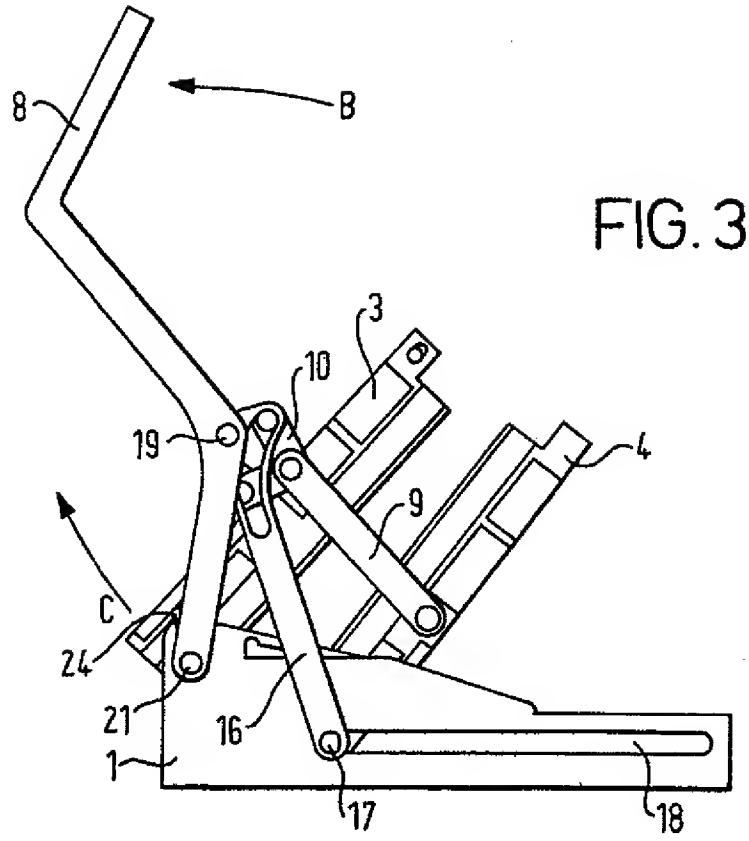


FIG. 3

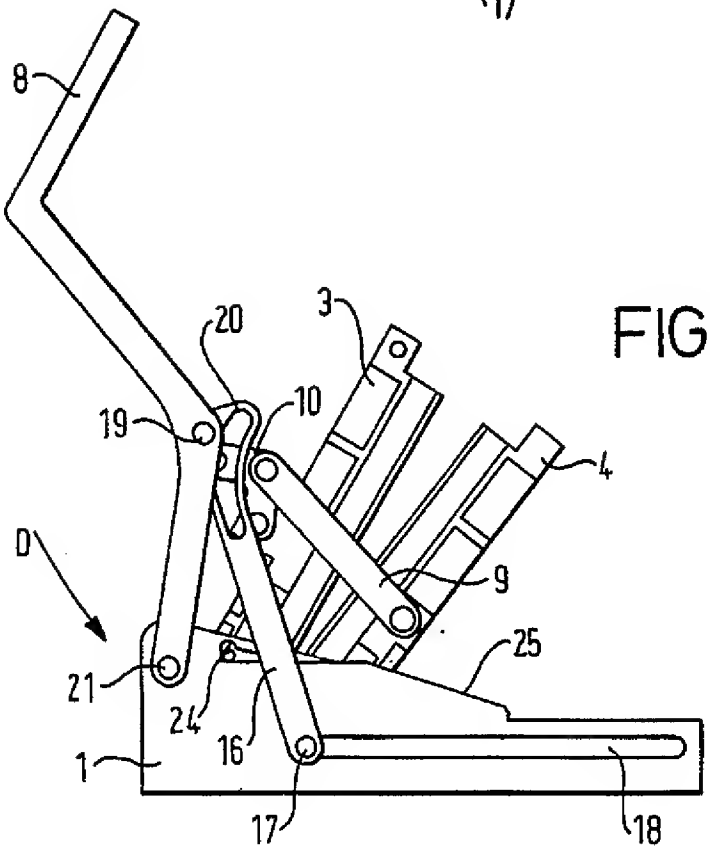
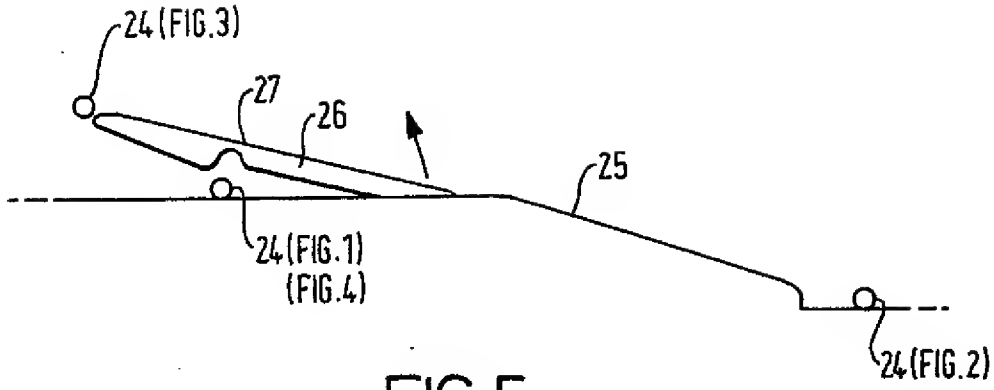


FIG. 4


24 (FIG.3)
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24 (FIG.1)
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24 (FIG.2)

FIG.5

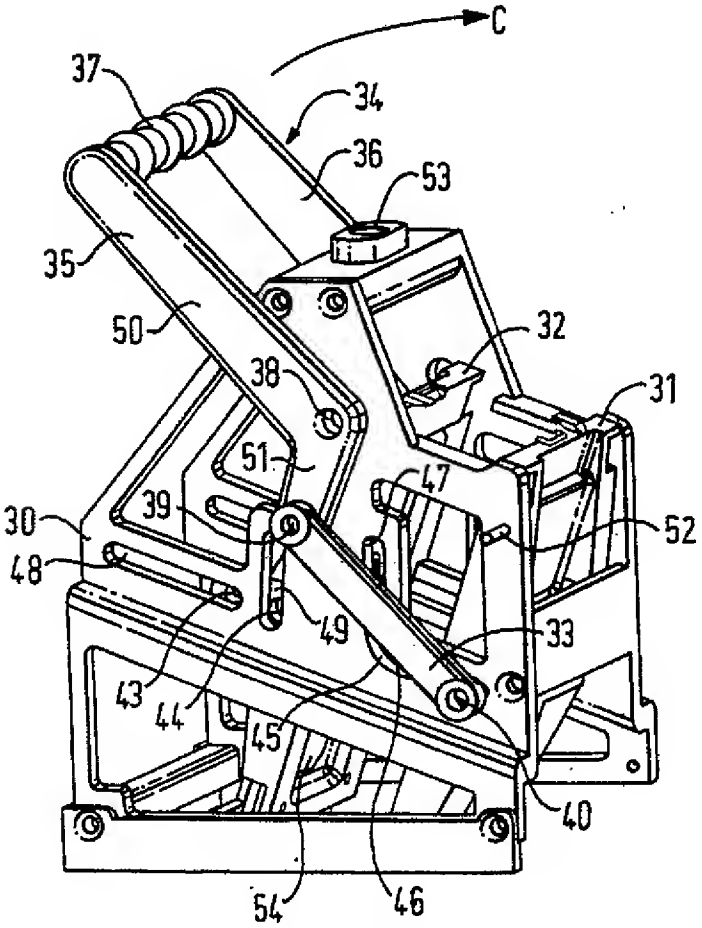
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FIG.6

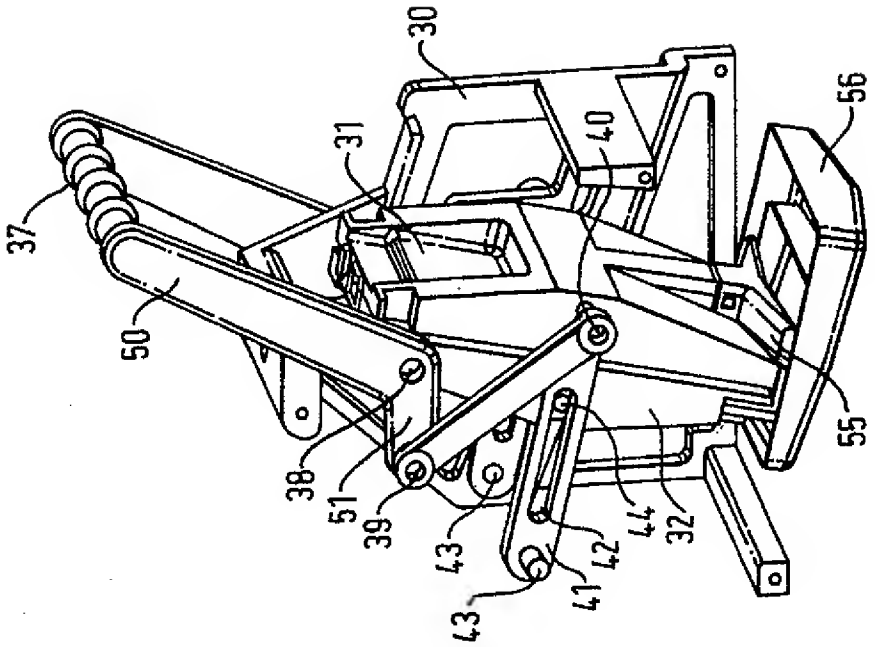
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FIG.8

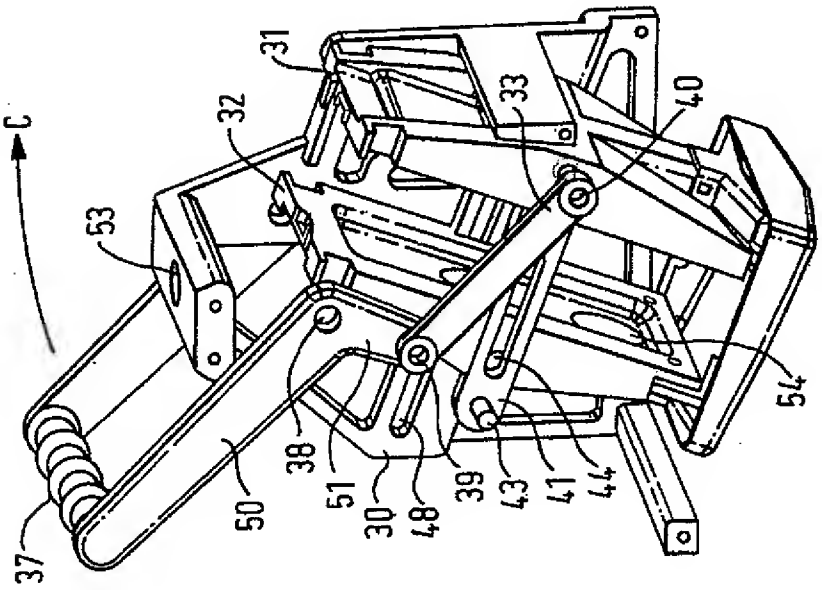
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FIG.7

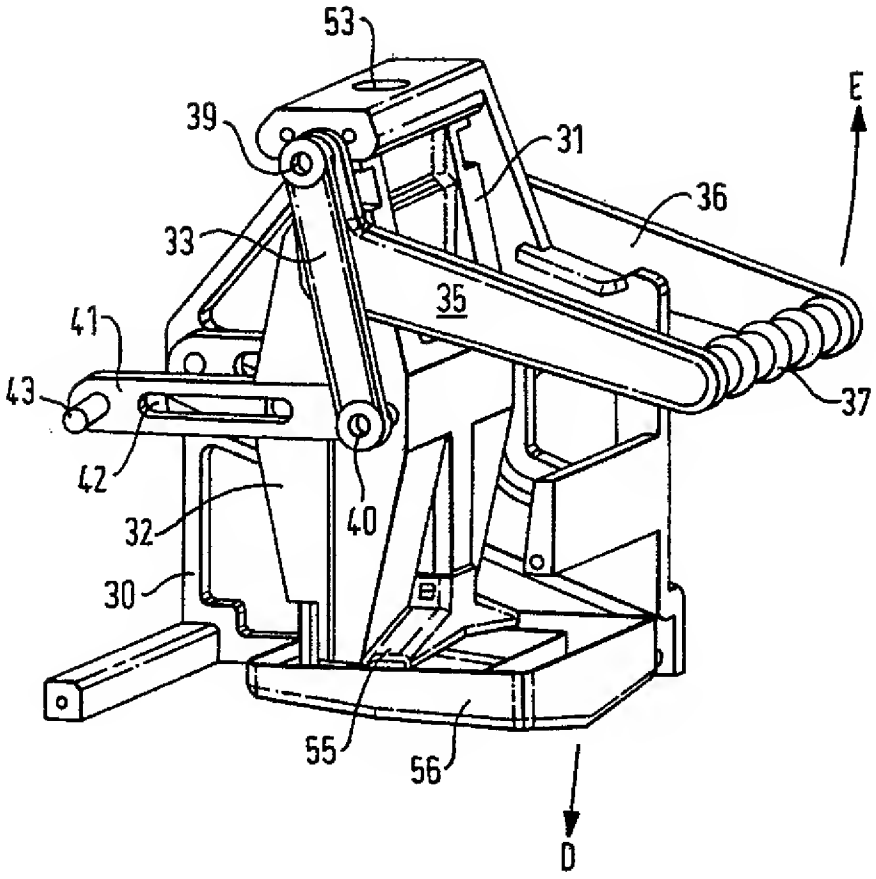

FIG. 9

INTERNATIONAL SEARCH REPORT

Int. Ional Application No
PCT/EP 99/08698

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A47J31/40

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A47J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 526 652 A (MARS LTD) 18 November 1983 (1983-11-18) page 5, line 12 -page 11, line 1; figures 3-8	1,2,4,5
Y		3,6,7,9
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
16 February 2000	24/02/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Bodart, P

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International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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